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(21) (A1) 2,012,199
(22) 1990/03/14
(43) 1991/09/14
(52) 379-73

(51) INTL.CL.[5] H04M-1/00

(19)(CA) **APPLICATION FOR CANADIAN PATENT** (12)

50984-41

(54) Communications Handset with Menu Selection

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Le Dain, Timon M. - Canada ;

(73) Same as inventor

(57) 8 Claims

Notice: The specification contained herein as filed

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A communications handset comprising:
presenting means for presenting items of a menu;
first switch means;
control means responsive to the first switch means for controlling the presenting means to identify an item of the menu for selection of the item; and
second switch means;
the control means being responsive to the second switch means for performing a function corresponding to the currently identified item of the menu.

2. A communications handset as claimed in claim 1 wherein the first switch means comprises a rotary switch and the control means is responsive to a direction of rotation of the rotary switch.

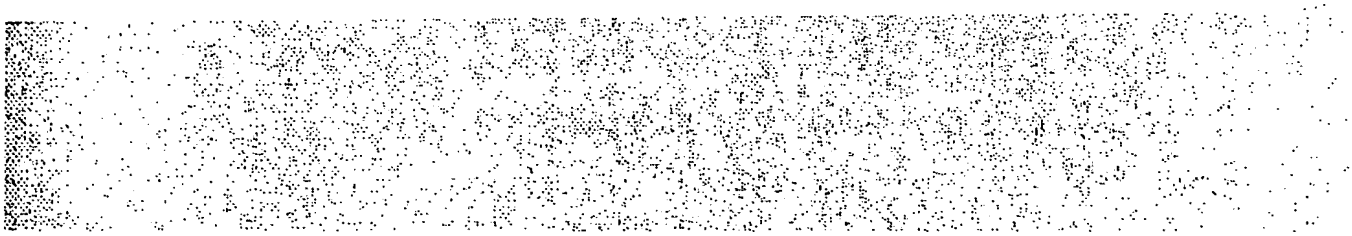
3. A communications handset as claimed in claim 2 wherein the second switch means is arranged to be operated by pressure on the rotary switch.

4. A communications handset as claimed in claim 1 wherein the second switch means is arranged to be operated by pressure on the first switch means.

5. A communications handset as claimed in claim 1 wherein the presenting means comprises a visual display.

6. A communications handset as claimed in claim 1 wherein the presenting means comprises an audible voice signal.

7. A communications handset as claimed in claim 1 wherein the first switch means is positioned on a side of the



handset to be operable by a thumb of a hand holding the handset.

8. A communications handset as claimed in claim 3 wherein the rotary switch is positioned on a side of the handset to be operable by a thumb of a hand holding the handset.

R. John HALEY
Patent Agent for the Applicants

COMMUNICATIONS HANDSET WITH MENU SELECTION

Field of the Invention

The present invention relates to communications handsets, and is particularly concerned with a handset which provides for the presentation and selection of items of a menu.

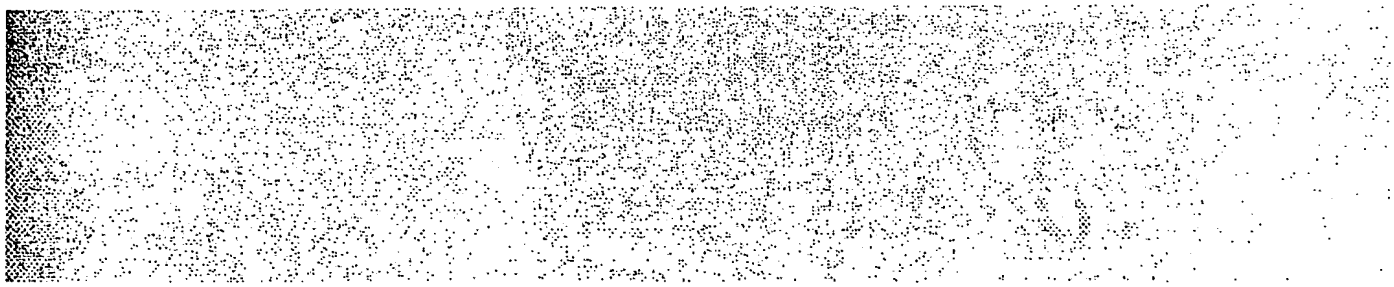
Background of the Invention

The use of menus for accessing various levels of options for such devices as computers and telephones is well known. Visual display and voice are both used for presenting menu selections. However, known techniques for accessing voice or visual selections have disadvantages.

With display based menus, the user typically accesses soft keys displayed on a screen by pressing on keys on a keyboard associated with the soft keys. This technology is difficult to use where keys are hard to operate due to their size or where display areas are too small to display properly the available options. The display based menu also requires that the user be in close proximity both to reach the keys and to interpret the soft keys shown on the display. The use of such display based menus can further require the use of both hands, which can be difficult in such fields as telephony where one hand may be required to hold the handset of a telephone.

With voice menu based services, the user typically has to listen to a number of alternative choices from a voice synthesized menu. With such a menu the user must remember desired options in the menu and respond only when and as required.

Thus both display and voice menus can be awkward to use in certain situations such as telephony applications where one hand is usually required to hold the handset of the



telephone, and especially in situations such as cellular phones where the user's attention can be on driving and therefore one hand is required to drive a vehicle while the other is required to hold the handset of the cellular phone unit.

Summary of the Invention

It is an object of the present invention to provide an improved communications handset.

According to the present invention there is provided a communications handset comprising: presenting means for presenting items of a menu; first switch means; control means responsive to the first switch means for controlling the presenting means to identify an item of the menu for selection of the item; and second switch means; the control means being responsive to the second switch means for performing a function corresponding to the currently identified item of the menu.

In an embodiment of the invention described in detail below, the second switch means is arranged to be operated by pressure on the first switch means, which can be a rotary switch to the direction of rotation of which the control means is responsive, and which is conveniently positioned on a side of the handset to be operable by a thumb of a hand holding the handset, thereby facilitating one-handed use of the handset. The presenting means can comprise a visual display and/or an audible voice signal.

The interface provided by the present invention is particularly useful in applications such as portable or cellular phones where a large number of services and features can be made available within a limited display size. The interface is also useful in wireless, or cordless, telephones and pocket pagers.

Brief Description of the Drawings

The invention will be further understood from the following description, by way of example, with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is an isometric view of a telephone handset according to an embodiment of the invention;

Figure 2 is a top plan view of a known form of rotary switch which is incorporated in the handset of Figure 1;

Figure 3 is a top plan view of the telephone handset of Figure 1;

Figure 4 illustrates in more detail how the rotary switch is incorporated in the handset;

Figure 5 is a block diagram of circuitry connected to the rotary switch; and

Figures 6 and 7 are top plan views of the telephone handset of Figure 1 with different information displays.

Detailed Description

Figure 1 illustrates a telephone handset 10 incorporating a selecting means constituted by a rotary switch 20 which is located in the handset 10 for convenient rotation by the thumb of a person's hand holding the handset. The handset also includes presenting means, constituted by a display panel 30 using liquid crystal or other display technology. The display panel 30 displays information such as menu choices, soft keys, or prompts 32b, 32c which can be selected as described below to cause a controller to perform desired tasks. The menu choices, for example, can include a list of names and phone numbers, a selection of telephone services, or a selection of operational parameters, or a combination of any of the above.

Figure 2 illustrates the rotary switch 20 in greater detail. The rotary switch 20 is of known form and comprises a thumbwheel 22 having a number of ridges 23 thereon for facilitating the rotation of the thumbwheel 22. The

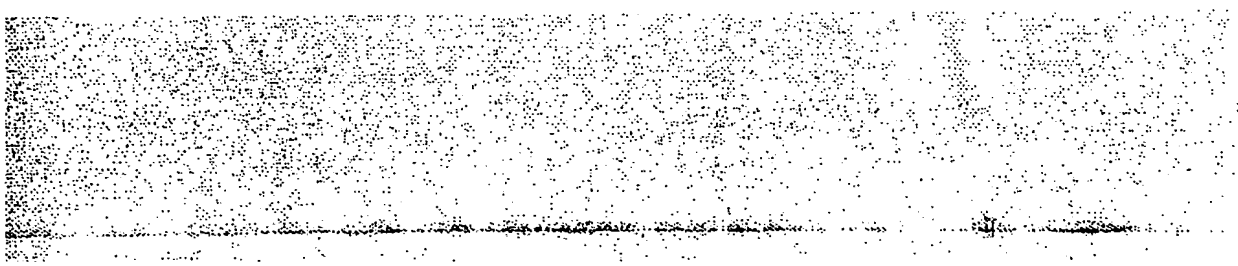
thumbwheel 22 further comprises a member 21 having a plurality of arcuate formations 24 around the periphery of the member 21. The formations 24 are of such size and shape as to conveniently allow a ball 29 to fit therein. A spring 28 keeps the ball 29 in contact with the member 21 and thereby provides resistance to rotational motion of the thumbwheel 22. With such an arrangement the rotation of the rotary switch 20 is well defined into discrete steps as the ball 29, the spring 28, and the arcuate formations 24 prevent the thumbwheel 22 from revolving more than a defined number of degrees at one time, in this instance 22.5°.

Member 21 has thereon a conductive pattern 40 which comprises an array of conductors 42 having conductive pads 44 and 46. A controller 50 is used to determine in known manner the position (step count), and direction of rotation, of the rotary switch 20. The controller 50 determines current flow between contacts 25, 26 and contact 27 in resilient contact with the member 41 and the conductive pattern 40 and assigns a logical value of 1 or 0 depending on whether each of the contacts 25 and 26 is conducting current or not, respectively. Contact 27 is always in contact with the central portion of the conductive pattern 40 and acts as a common terminal. The direction of motion of the rotary switch 20 is determined by the connections the contacts 25, 26 make with the conductors 42.

For instance, starting with the contacts 25, 26 in a position between conductors 42 (as illustrated in Figure 2) a logical value of 00 is obtained (ie. as each contact 25, 26 is in a non-conductive region of the rotary switch 20 no current flows in either contact 25, 26 as there is no electrical path to contact 27, therefore a logical value of 0 results for each contact 25, 26). A clockwise movement C of the rotary switch 20 will cause contact 25 to come into contact with a conductive pad 44 on one of the conductors 42, thus causing current to flow in contact 25 due to the electrical path

created between contacts 25, 27. Consequently a logical value of 1 for contact 25 is determined resulting in a logical value of 10 for the contacts 25, 26. Further clockwise rotation of the rotary switch 20 will bring the contacts 25, 26 into contact with both conductive pads 44, 46 of conductor 42 thus producing a logical value of 11. Continuation of the clockwise motion will cause contact 25 to disengage from the conductive pad 44 thus resulting in a logical value of 01 for the contacts 25, 26. Thus a sequence of logical signals 00, 10, 11, 01, 00 is created as the rotary switch 20 is rotated in a clockwise direction C. If the rotary switch 20 is rotated in a counter-clockwise direction A the resultant logical sequence 00, 01, 11, 10, 00 is created. Consequently the controller 50 can easily detect the direction of rotation of the rotary switch 20 by recognizing the resultant logical sequence created.

The controller 50 responds to rotation of the rotary switch 20 to change information displayed on the display panel 30. Preferably, the display panel 30 displays a plurality of selectable items or menu choices, one of which is highlighted at any time. Rotation of the switch 20 in either direction causes the controller 50 to change the highlighted item. If the display panel 30 can simultaneously display all possible selectable items, this can be achieved by changing the highlighted position on the display. Alternatively, it can be achieved by scrolling the display of the selectable items through a fixed highlighted position, in a direction corresponding to the direction of rotation of the switch 20. A combination of these techniques may be used, or with a small display only one selectable item could be displayed at a time, without highlighting, in a selection position, using the latter technique. In the following description only highlighting is referred to for brevity and convenience, but it should be understood that any of these possible techniques may be used.



Thus on each transition from a value of 00 in the above logical sequences, the controller 50 highlights the next soft key 32 on the display panel 30 in the appropriate direction as determined by the direction of rotation of the rotary switch 20 (eg. referring to Figure 1, a clockwise rotation C of the rotary switch 20 will cause a soft key 32c to the right of the presently highlighted soft key 32b to be highlighted, and a counter-clockwise rotation A of the rotary switch 20 will cause a soft key 32a (not shown in Figure 1) to the left of the presently highlighted soft key 32b to be highlighted).

Other methods of determining the position and direction of rotation of the rotary switch 20 may be used, and many exist in the prior art, an example of which is optical coupling. The selection of which technology to use depends on the specific application requirements and conditions, such as costs.

Figure 3 illustrates a possible display of soft keys 32 on the display panel 30 of the handset 10. As the controller 50 within the handset 10 monitors the position of the rotary switch 20 it causes a soft key 32 (a, b, or c) to be highlighted (eg. by placing a box around the soft key 32 or by displaying the soft key 32 as underlined, in reverse video, or, as illustrated by soft key 32b in Figure 3, in bold characters). The highlighting is used to inform the user of which soft key 32 (a, b, or c) is currently selected. As the rotary switch 20 is rotated, the controller 50 highlights each of the soft keys 32 in turn in the appropriate direction (right or left) according to the direction of movement (counter-clockwise or clockwise, respectively) of the rotary switch 20.

Referring to Figure 4, the handset 10 also includes a micro-switch 60 having an actuator 62 positioned adjacent to the rotary switch 20. Pressure on the rotary switch 20, when

a desired soft key 32 is highlighted as described above, causes the rotary switch 20 to move or pivot about a mounting axis 49 of the switch 20 and come into contact with the actuator 62 of the micro-switch 60, consequently closing its contacts. The contacts of the micro-switch 60 are coupled to the controller 50 to cause it to perform functions associated with the currently highlighted soft key 32 upon such momentary depression of the rotary switch 20.

Figure 5 illustrates, by means of a block diagram, the process involved in selecting and highlighting a particular soft key 32. As illustrated in Figure 5, the controller 50 comprises rotary switch debounce and direction detect circuitry 50a as described above; a microprocessor 50b (including Read Only Memory (ROM) and Random Access Memory (RAM) for firmware control, and Input/Output (I/O) ports); and a custom silicon integrated circuit 50c for performing telephony functions. The firmware for microprocessor 50b controls the information displayed in the display 30 (eg. soft keys 32 and highlighting) as well as which telephony functions are being performed. A line A provides the microprocessor 50b with the step count, direction and rotational speed of the rotary switch 20, in response to signals from the rotary switch 20 (via line B and contacts 25, 26, and contact 27 (as illustrated in Figure 2)) being debounced and processed by the debounce and direction detect circuitry 50a. Using this information, the microprocessor 50b displays and highlights the appropriate soft key 32 as described above. The microprocessor 50b is coupled to the micro-switch 60 contacts via a line C, performs debouncing of micro-switch operations under the control of its firmware and performs the functions of the currently selected soft key 32 when the rotary switch 20 is depressed thereby operating the micro-switch 60, also under firmware control.

Figures 6 and 7 illustrate how a telephone number could be selected for dialling. A display area 34 in the

display panel 30 in this case includes a menu containing selectable items constituted by the digits 1 to 9 and 0, and the word "DIAL", and a display area 36 displays selected digits of the telephone number. In Figure 6 the number 6, which is highlighted in the display area 34, is the last selected digit in the displayed telephone number in the display area 36, this number having been selected by rotating the rotary switch 20 until 6 was highlighted and then depressing the rotary switch 20, with the controller 50 updating the display in the display area 36. If the rotary switch 20 is depressed a second time the number 6 is again selected and displayed as shown in Figure 7. When it is desired to dial the selected telephone number, the rotary switch 20 is rotated until the soft key "DIAL" is highlighted in the display area 34, and then the rotary switch 20 is depressed which instructs the controller 50 to proceed to dial the displayed telephone number.

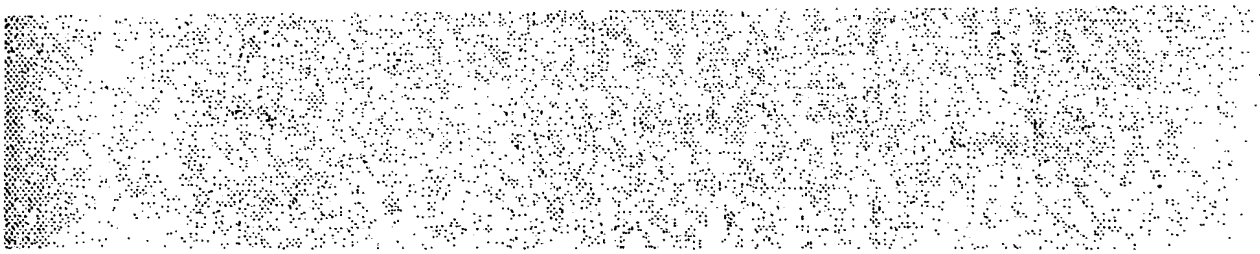
To provide additional flexibility when viewing long menus, the controller 50 can be designed to allow quick movement through the soft keys 32. For instance, if the rotary switch 20 is rotated in either direction quickly, rather than stepping through each of the soft keys 32 in turn it is advantageous to skip over the display of one or two, or more, soft keys 32. Consequently a quick indication of the present location within the menu can be obtained. This decreases the amount of time needed to scan long menus. The display increments for soft keys 32 can be determined, for example, by a linear function of the rotational velocity of the rotary switch 20 when above a desired threshold or by other desirable relational functions. In a preferred embodiment the determination of when to speed up the display of the soft keys 32 is determined by the controller 50 by averaging the time for three successive steps of the thumbwheel, eg. the step time between the contacts 25, and 26 making contact with successive conductors 42. Typically, if the average step time between samples is less than 4

milliseconds, the display of soft keys 32 is sped up. An average step time greater than 4 milliseconds will result in the display of each soft key 32 in turn. This feature provides quick access to the soft keys 32 when the number of soft keys 32 is great, or the familiarity of the user with the interface is such that the user can quickly go through the soft keys 32 to select a desired action.

A further feature of the interface allows for the rotation of the rotary switch 20 when it is depressed, with the contacts of the micro-switch 60 closed. In this mode, the soft keys 32 can be quickly highlighted in turn, in the direction defined by the initial rotation of the rotary switch. It is to be noted that the rotary switch 20 need not be constantly turned with this feature, it is only necessary to briefly rotate the rotary switch 20 in the desired direction. The highlighting of the soft keys 32 by the controller 50 is stopped when the rotary switch 20 is released, thus opening the contacts of the micro-switch 60. Selection of a desired soft key 32 is then completed by depressing the rotary switch 20. The speed of this automatic highlighting can be a function of the number of soft keys 32 currently displayed.

In some instances it is desirable to edit entries in a particular menu, such as a list of names or telephone numbers. To accomplish this the rotary switch 20 can be depressed twice (within a user selectable time window, eg. 24 msec.), the controller 50 responding to this to provide an edit mode for the particular soft key 32 chosen, if that particular soft key 32 is appropriate for editing. Editing is then performed by selecting characters from a given menu in the manner described above.

It should be realized that the menu displayed on the display panel 30 may be a single level menu offering basic choices, or it may be a hierarchical set of menus in which the



selection of a soft key 32 in one menu can cause another menu to be displayed. Furthermore, if a large number of soft keys 32 are available which would not all be able to be displayed on the display panel 30, a scrolling menu may be designed wherein the left or rightmost selection would be scrolled off the screen and replaced by another selection in the right or leftmost position respectively. It should also be realized that rather than having the soft keys 32 displayed in a left to right fashion, they can be displayed in a top down fashion.

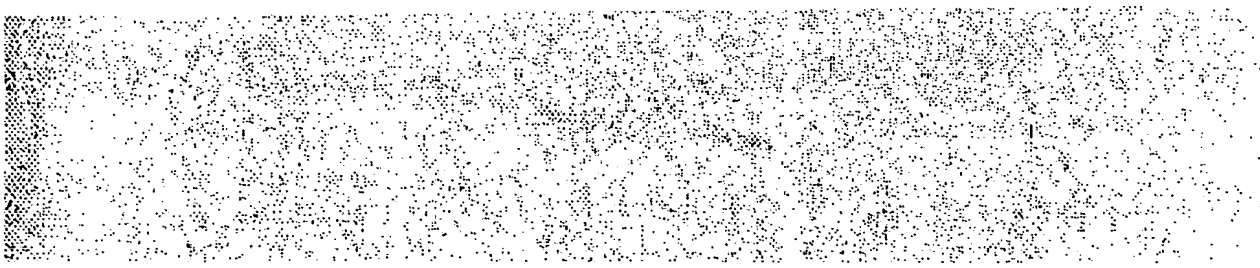
To help a user locate the beginning or end of a menu, the controller 50 can be arranged to stop the scrolling of the soft keys 32 at the beginning or end of the menu. Conversely, if a user wishes to be able to continuously scan through a menu, the controller 50 can be arranged to wrap the display of the soft keys 32 such that the first soft key 32 of the menu will be displayed following the last soft key 32 of the menu, and vice versa.

To enhance the useability of the handset 10 in such environments as cellular phone use in automobiles, wherein concentration is diverted from the handset 10, audible voice signals may be included in the presenting means. With audible voice signal it is possible for a user to operate the rotary switch 20 without referring to the display panel 30 for an indication of which soft key 32 is presently highlighted. As each soft key 32 is highlighted it can be read to the user by a voice synthesizer (not shown) included in the unit. The voice synthesizer can be either a text to speech processor which reads the highlighted soft key 32 or it can be a pre-recorded pronunciation of the highlighted soft key 32.

As can be readily envisioned, the interface can be designed using a voice feedback method only if it is desired not to have, or space does not permit for, a display panel 30.

It can be further realized that the rotary switch 20 can be replaced by other selection means, such as a slide switch, the selection means incorporating a technique for discrete stepping.

Numerous other modifications, variations, and adaptations may be made to the particular embodiments of the invention described above without departing from the scope of the claims.



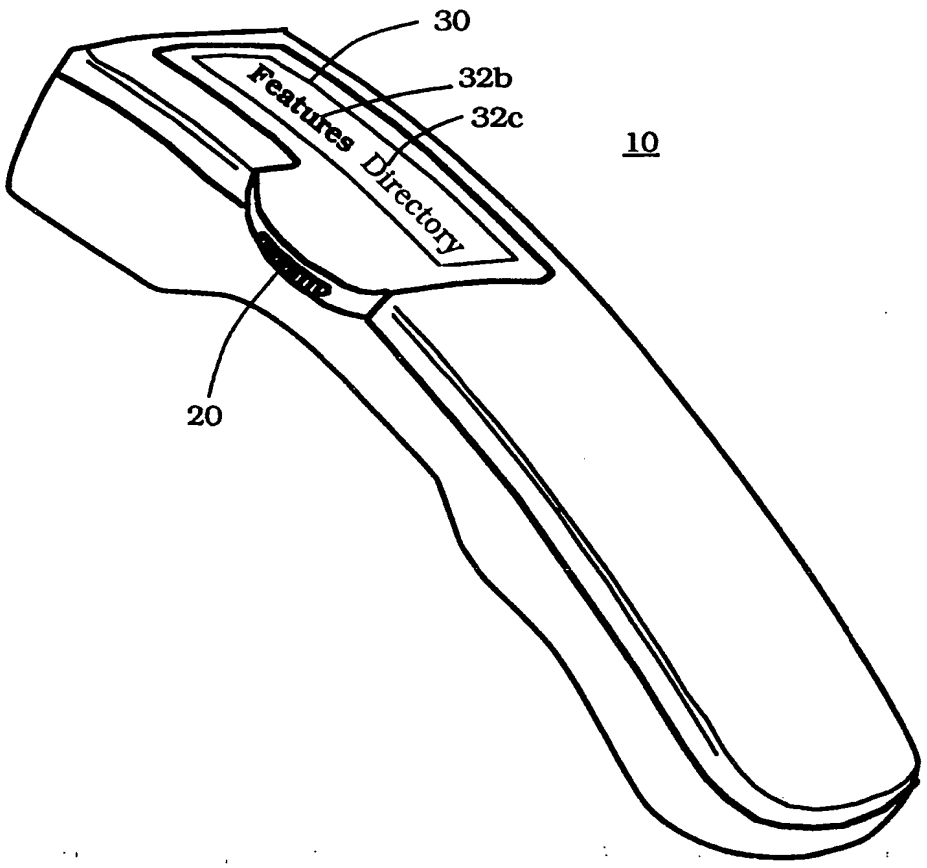


Fig. 1

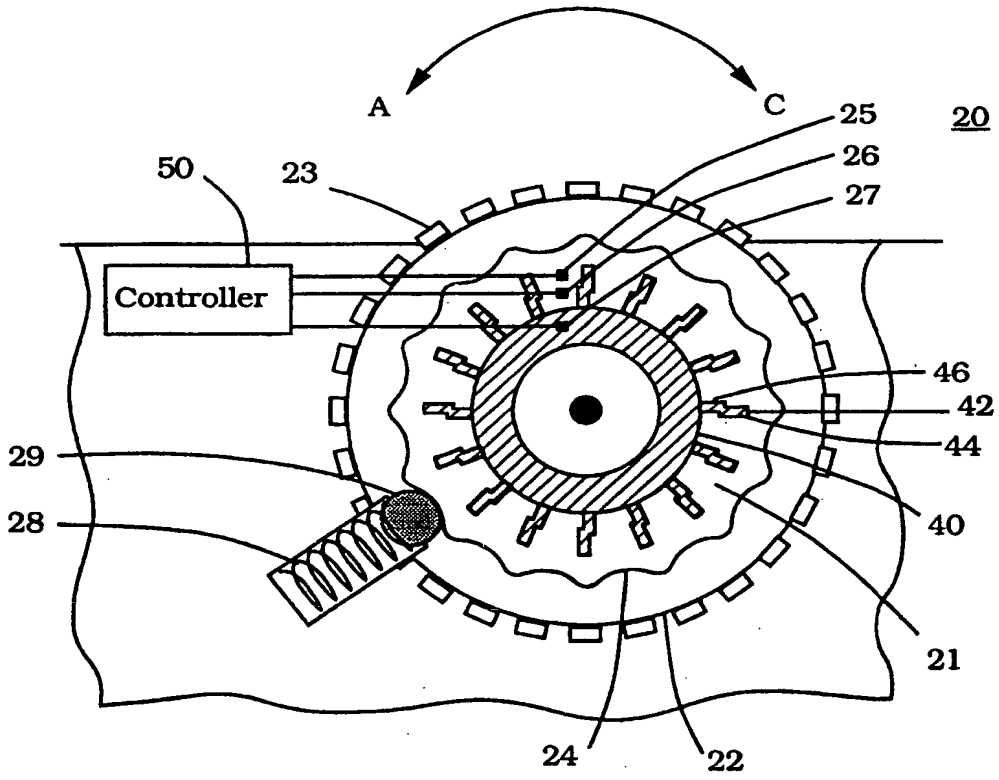


Fig. 2

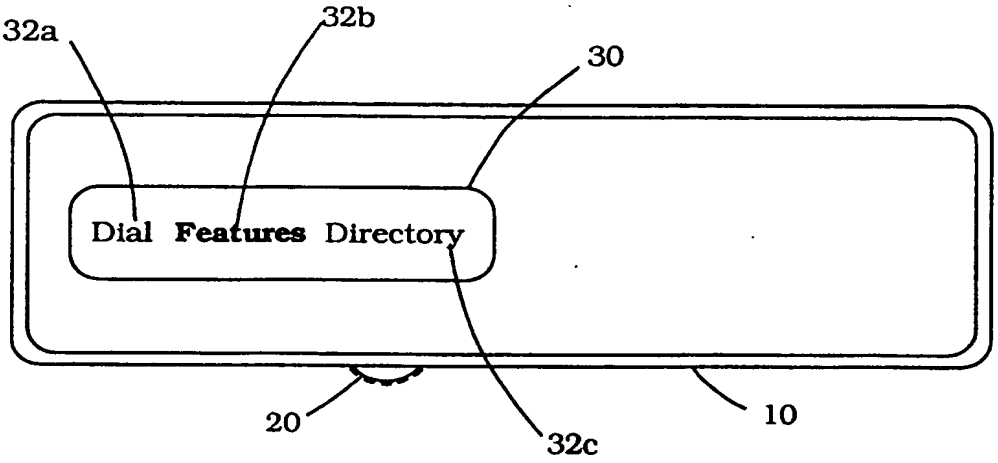


Fig. 3

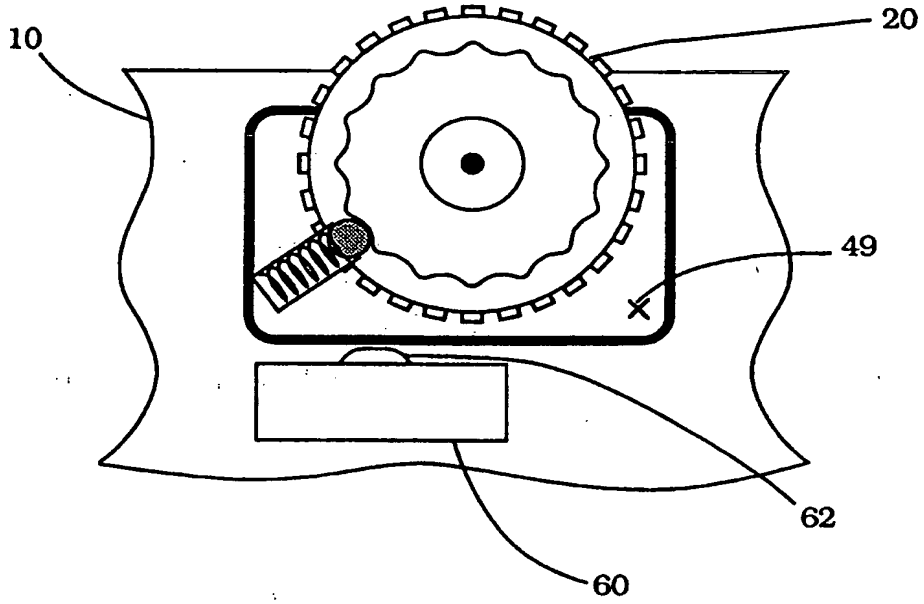


Fig. 4

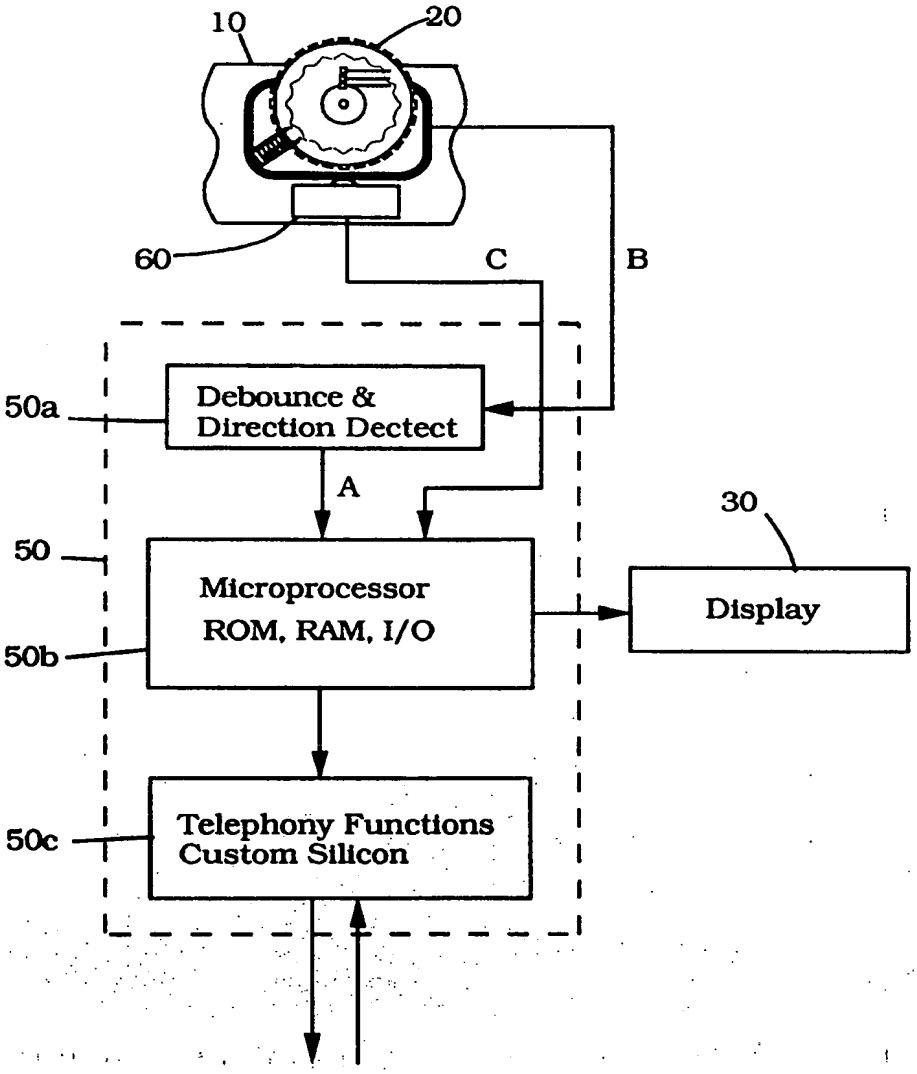

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Fig. 5

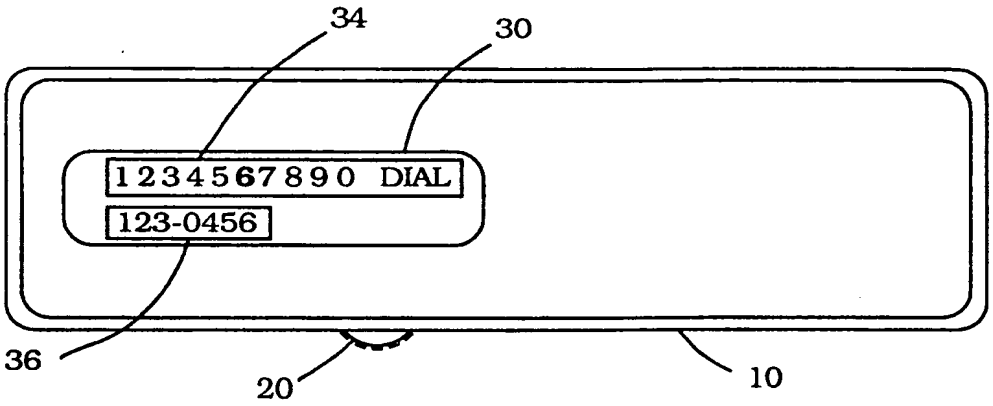
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Fig. 6

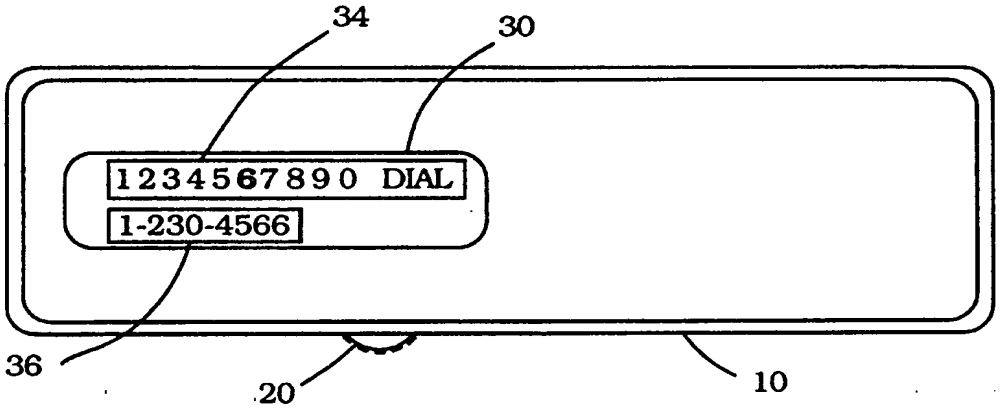
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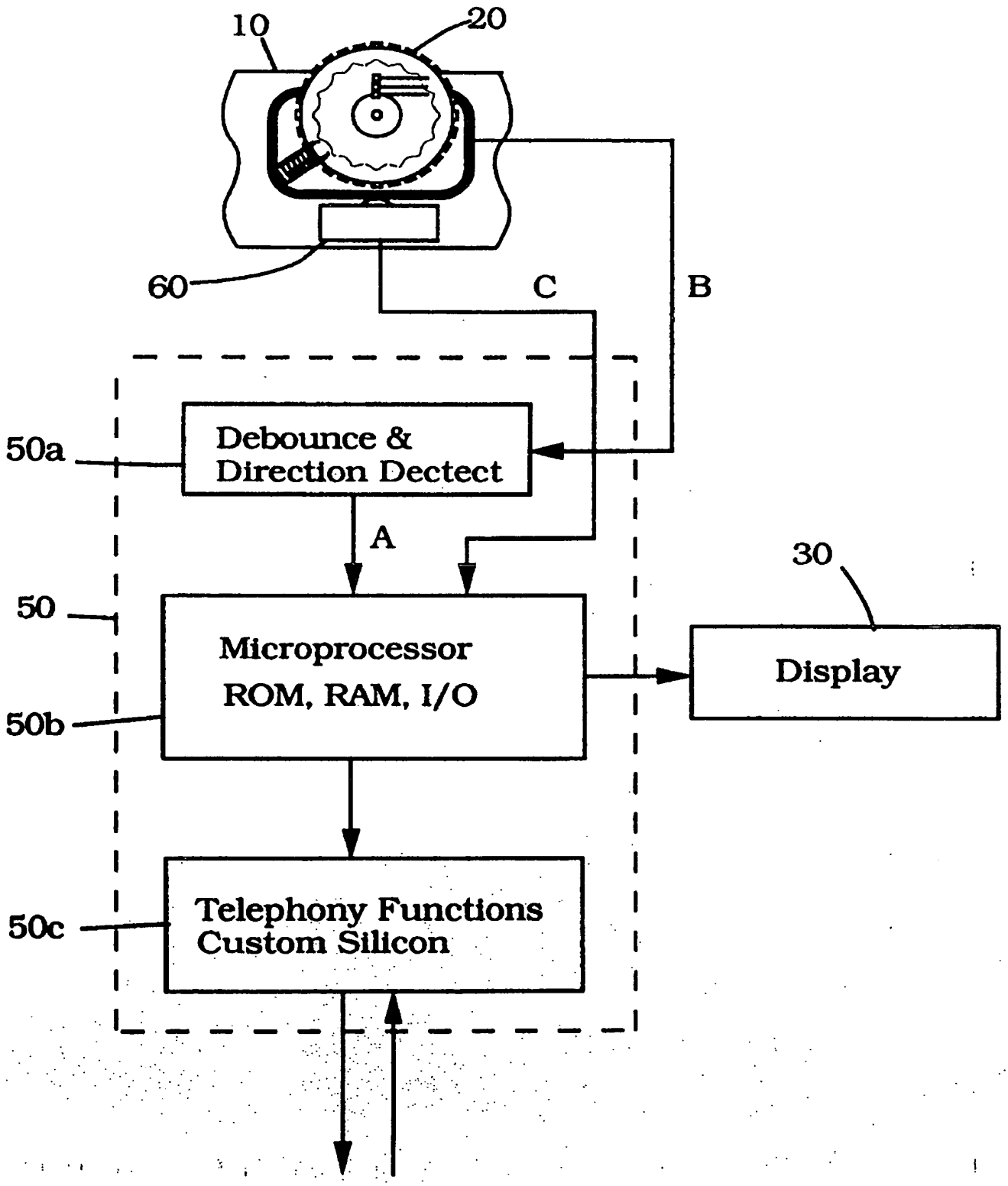
Fig. 7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